



## Darwin Initiative Final Report

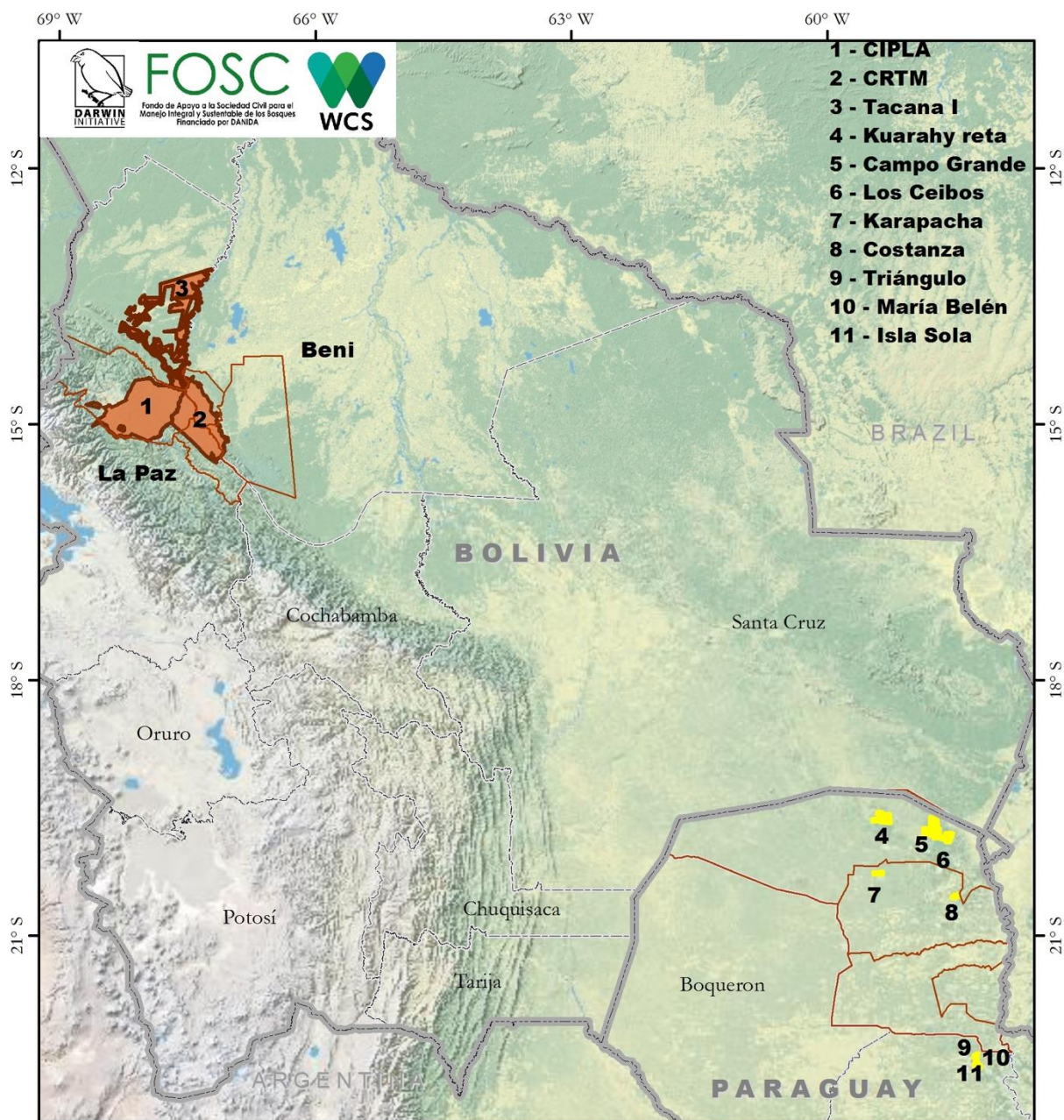
To be completed with reference to the Reporting Guidance Notes for Project Leaders (<http://darwin.defra.gov.uk/resources/>) it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

### Darwin project information

Project reference	21-004
Project title	Sustainable Ranching and Participatory Land Use Planning in Bolivia and Paraguay
Host country(ies)	Bolivia and Paraguay
Contract holder institution	Wildlife Conservation Society
Partner institution(s)	<b>Bolivia:</b> Tacana People's Indigenous Council (CIPTA), Lecos Apolo Indigenous Organization (CIPLA), T'simane Mosekene Regional Council (CRTM) and municipalities of Apolo and Ixiamas; <b>Paraguay:</b> The Environmental Law and Economics Institute (IDEA) (Note: only in Year 1), and local municipalities of Puerto Casado, Carmelo Peralta and Fuerte Olimpo.
Darwin grant value	£ 297,274
Start/end dates of project	1 Apr 2014 – 30 Mar 2017
Project leader's name	Lilian Painter Ph.D. Maria del Carmen Fleytas MSc
Project website/blog/Twitter	<a href="http://www.wcsbolivia.org">www.wcsbolivia.org</a> ; <a href="http://www.wcsparaguay.org">www.wcsparaguay.org</a>
Report author(s) and date	Maria del Carmen Fleytas, Laura Villalba, Lilian Painter, Nuria Bernal, Rodolfo Nallar. Jun 30, 2017

## 1 Project Rationale

The project was implemented in eight large private cattle ranches in Paraguay and three indigenous territories in Bolivia (Map 1). Livestock and derived products are important commodities in Latin America, and ranching is a key economic activity. However, ranching is associated with negative environmental impacts, including biodiversity loss, wildlife-human conflicts, deforestation, fires, soil degradation, loss of water quality and quantity, and greenhouse gas emissions. Ranching can also exacerbate social inequality by displacing vulnerable rural populations from access to land, natural resources and ecosystem services, and by excluding their interests from being taken into account in land use decisions. Across Latin America, ranching spreads and intensifies as human populations grow, roads are improved, and meat consumption rises.



**DARWIN PROJECT WORK AREAS**

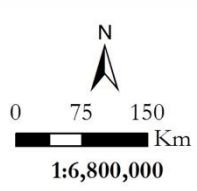
**LEGEND**

- International boundaries
- Departamental boundaries
- Municipal (Bolivia) and District lines (Paraguay)

**Darwin Project**

- Bolivia - project work areas-
- Paraguay - project work areas

**CARTOGRAPHIC INFORMATION**



*Map 1: Project Intervention Area*

The large-scale ranching typical of the Paraguayan Chaco and the small-scale ranching typical of north-western Bolivia (see Map 1) represent the two archetypal patterns of livestock expansion in Latin America. Because of their distinct contexts, Bolivia and Paraguay provide an ideal setting in which to implement and evaluate best practices for sustainable ranching at different scales. In this project, WCS worked to achieve “win-wins” for conservation and development by (a) improving ranching practices at the scale of the ranch; (b) engaging stakeholders in participatory land-use planning processes at the landscape scale; and (c) evaluating the effectiveness of interventions for future applications at the local and national scales.

## **2 Project Partnerships**

WCS designed this Darwin Initiative project to be implemented in coordination with three territorial indigenous organizations in Bolivia and three municipalities in Paraguay. In Bolivia, WCS worked closely with the Lecos Apolo Indigenous organization (CIPLA), the Tacana organization (CIPTA), and the T’simane Mosekene indigenous organization (CRTM). These organizations are the property right holders of the indigenous lands where activities were implemented, and the first two were critical to present indigenous concerns in municipal planning processes. Members of the directorates of these territorial organizations participated actively in project planning and implementation, including convening and participating in all community workshops. Enabling this participation and indigenous leadership required greater flexibility and sometimes led to changes in proposed timing of events. Challenges have also existed because of changes in indigenous leadership during the time of project implementation. Nevertheless, these difficulties were compensated by the legitimacy and local appropriation of project results. These partnerships predate and will continue beyond this project.

In Paraguay, the municipalities of Puerto Casado and Fuerte Olimpo fully participated in project planning, implementation, and reporting. In particular, Puerto Casado requested and signed an agreement for the delegation of some environmental responsibilities to the municipal jurisdiction by the Secretary of Environment (SEAM). Both municipalities will continue to work together with WCS to improve their capacity for territorial planning and in particular environmental management. Unfortunately, in the case of Carmelo Peralta there has been little progress because of poor governance resulting from political conflicts between the mayor and the municipal council. More recently, the municipal council expressed their interest in working with WCS to strengthen their capacity for territorial management, but WCS was unable to respond to this request due to the poor state of the dirt roads, which has isolated this area since early 2016.

## **3 Project Achievements**

Supporting documentation is detailed in Annex 2 and included in the following link:  
<https://drive.google.com/drive/folders/0BwQ--8yLqURXUzRIRGRBN2xuZ2c>

### **3.1 Outputs**

#### **Output 1: 20 projects to improve livestock management**

In Paraguay, baseline information and ranch management plans were developed during the first year. The second year was devoted to implementing these plans in six out of the eight ranches initially considered; two had to be dropped because of difficulties accessing them as a result of heavy rainfall that deteriorated the already poor road conditions. From April 2015 onwards, WCS provided technical assistance on the ground to these ranches, which are located in the Department of Alto Paraguay, Northern Chaco, across an area of 84,440 hectares. The technical assistance provided

focused on promoting more efficient and more environmentally friendly practices, and on monitoring the performance of ranch management plans to obtain higher productivity through land use intensification, as opposed to forest conversion to pastures. As a result, ranchers reported improved productivity and reduced losses due to jaguar predation (as reported in exit surveys). Livestock mortality rates in general decreased from an initial average of 2.98% to 2.48%, and calving rate increased from 17.83% to 20.16%. The smaller ranches showed a more accentuated improvement as a result of technical assistance.

In Bolivia, the collective nature of indigenous lands meant that management plans were developed for three indigenous lands rather than for individual communities, and were later implemented in different degrees by a total of 17 communities (14 Lecos Apolo communities, 3 Tacana communities, and 2 T'simane Mosekene communities). Initially, each indigenous territory received support to develop specific sustainable pasture intervention maps and work plans, and then a sustainable ranching plan was developed for each indigenous land. The ranching plan or strategy for the Lecos indigenous land was used to guide the successful proposal to the Bolivian Indigenous Fund. All 17 communities participated in training and adopted a cattle sanitary calendar. Pasture rotation management interventions have been implemented by seven communities with technical assistance from the project. Training was conducted through participatory field schools, which included *in situ* theory and practice through the development of five training modules. Technical information was transmitted to 1087 local people (615 men and 472 women) and focused on animal husbandry, animal health, and sustainable pasture management, as well as small domestic animal feeding; the latter was implemented as a complement to provide specific support to women's livelihoods.

Additionally, five pilot pasture and cattle management units were established in Tupili and Chirimayu in the Lecos Apolo indigenous land; Puente Yucumo and Alto Colorado in the T'simane Mosekene territory and San Pedro in the Tacana territory. A total of 226 families live in these five communities. In the first four of these units, pastures are under management and protein banks have been improved using legumes. Furthermore, we established nurseries for native trees in Tupili and Yacumita (neighbouring Alto Colorado) for agroforestry systems. Species selection for the agroforestry systems was supported by information based on surveys of the natural vegetation found in the three indigenous lands. The pastures in San Pedro are not degraded and improving the sanitary treatment of cattle was the management priority. In San Pedro, a corral was established to allow for greater control of the animals, improved sanitation and reduced jaguar predation risk to calves.

As a result of the training provided to the small-scale ranchers on pasture management, and the implementation of improved pastures and rotational grazing, there has been an increase in carrying capacity from 0.03 animal unit production/ha (APU/ha) to 1.06 APU/ha in the Apolo indigenous land and an increase from 0.8 to 1.36 APU/ha in the T'simane Mosekene indigenous land.

During the development of the health baseline in 2014, we found 10 types of pathogens in a sample of 129 cows, including the Infectious Bovine Rhinotracheitis virus, 6 roundworms, 1 tapeworm, and two protozoan parasite species. In 2016, exit evaluations with 67 cows registered two roundworms and 1 protozoan. Interviews carried out in 2014 with 55 indigenous cattle owners reported 32.9% natality rates and 19.17% mortality of calves. Exit interviews with 83 indigenous cattle owners showed a modest increase in natality from 32.9% to 33.2% and a reduction in mortality of calves from 19.17% to 17.24%.

Regarding forest loss, in Paraguay the six properties receiving continuous technical assistance had an annual deforestation rate of 2.20% between 2014 to 2016 and resulted in a loss of 961 hectares. This is less than half the current rate of deforestation in the rest of the Paraguayan Chaco, where the average annual rate of deforestation between 2014-2016 was 5.4%. This shows a stabilization of the

agricultural frontier, despite the fact that these proprietors are legally able to deforest up to 40% of their forests, equivalent to 17,492 hectares within these six properties. Nevertheless, within the project timeframe we can conservatively claim the avoidance of deforestation of 1,398 hectares that would have been cleared under the average deforestation rate in the Chaco.

Regarding forest loss within the Bolivian intervention areas, GIS analysis showed a 2.51% rate of forest loss between 2014 and 2016 along a 4 km buffer either side of the road along the edge of the T'simane Mosekene indigenous land. In comparison, areas along the same road but not under indigenous land tenure and management showed deforestation rates of 5.12%, or twice as high. If we double the hectares of forest lost within the indigenous land during that period we can show that through improved ranching practices we prevented the loss of 92 hectares along that road between 2014 and 2016.

In the case of the Lecos indigenous land, such a comparison was not possible, as the indigenous land is still in the process of land titling. Nevertheless, it is possible to extrapolate average deforestation rates in the municipal jurisdiction and project these rates of forest loss onto the areas zoned for activities compatible with forest conservation within the Lecos indigenous land (430,844 hectares), leading to an avoided potential loss of 2,154 hectares between 2014 and 2016, under a scenario of implementation of the indigenous land use plan.

In the case of the Tacana indigenous land, deforestation rates along the San Buenaventura to Ixiamas road already showed deforestation rates which were four times lower than those found in neighboring areas not under indigenous management and therefore could not be considered a direct result of the project (<https://www.iucn.org/content/tacana-people-define-future-forest>). Therefore, a more careful analysis of the direct impact on forest loss in Bolivia and Paraguay during the project duration can be conservatively estimated as 3,644 hectares, and not the 9,000 hectares initially estimated.

Mitigation of conflicts between carnivores and livestock was evaluated through base line and exit interviews to record retaliatory killing of jaguars and cattle losses to wild predators. Retaliatory killing of jaguars in each private property and both indigenous lands was established through informal interviews and were sensitive because they are illegal in both Paraguay and Bolivia; thus, monitoring of jaguar kills was triangulated with information of cattle losses to jaguar predation, also gathered through interviews. Baseline interviews with representatives of the six private ranchers reported between 3-4 cases of retaliatory killing incidents annually in each ranch over a 5-year period. After the project provided guidance on how to mitigate conflicts with big cats and better manage spatial cattle arrangement no jaguar killings were observed in the field or during exit interviews between 2014 and 2016, and no predation events of calves were registered after the use of LED lights and cow bells as deterrents.

## **Output 2: 5 blueprints for municipal land use plans and 8 ranch zoning plans**

In Paraguay, baseline maps were elaborated in close consultation with eight private ranchers to identify critical conservation areas. In the districts of Puerto Casado, Fuerte Olimpo, and Carmelo Peralta in Paraguay 30 structured interviews and five workshops were held, involving a total of 218 participants, of which 48% were women. In these workshops, information on land use planning and participatory processes was presented, setting an important basis for community inclusion in municipal plans. Despite delays caused by unfavourable weather conditions, a second set of workshops was carried out in 2016 with different stakeholder groups; 204 participants attended, of which 66% were women. All participants in both workshops expressed their satisfaction with the inclusion of their vision and needs, and this was the first time most of them had ever been consulted or had participated in natural resource or land use planning events. The new municipal authorities in

Puerto Casado responded favourably to the technical support and established an Environmental Technical Unit. The project provided this unit with basic equipment as well as theoretical and practical training to three municipal officers on the use of Geographic Information Systems (GIS) for monitoring of natural resources. The project helped the authorities in Fuerte Olimpo municipality to sign a by-law to formally create the Environmental Office and establish the institutional framework to allow the municipality to develop additional bylaws to safeguard natural resources in their territory. These additional bylaws were informed by a methodological guide to improve municipal management that was produced previously by IDEA and delivered by WCS to each municipality. One of the clear priorities identified in this guide is the need to establish a local tax on certain land uses, such as cattle ranching, in order to provide the municipality with additional funds for their Environmental Technical Unit. Thanks to the project support, one by-law was signed in Fuerte Olimpo creating that tax. Another by law was signed in Puerto Casado regulating the disposal of solid waste. In Fuerte Olimpo, the full operation of the Environmental Office was slowed down by elections. Unfortunately, Carmelo Peralta authorities did not advance in a similar manner, although they undoubtedly benefited from some of the training events.

In Bolivia, during the first year of project implementation, critical watersheds and community natural resource use areas were identified in the Ixiamas and Apolo municipalities to guide land use planning processes. These areas were also incorporated into their strategic municipal plans. We also supported Apolo and Ixiamas municipalities response to the change in legislation (Law 777) which replaces municipal development plans with Integral Territorial Plans (PDTI). We adjusted and complemented the diagnostic developed for the Municipal Development Plan and produced a draft Programme for Climate Change in Ixiamas, as a blueprint to guide the development of land use plans under this new legal framework. We provided technical and financial support to workshops in both Ixiamas and Apolo municipalities to promote dialogue between the APMT (Plurinational Authority of Mother Earth) and municipal authorities, indigenous territorial organizations and other stakeholders. Agreements to support actions promoting forest conservation under the Joint Mechanism of Climate Change Mitigation and Adaptation were signed in both Ixiamas and Apolo municipality. In the latter, a municipal by-law (007/2013) to implement this agreement was approved by the municipal council and is under implementation. Exit evaluations with the participants of these land use planning processes of the level of satisfaction with the degree to which their concerns had been considered was 61.6% in Ixiamas and 82% in Apolo.

### **Output 3: Report on the impacts of sustainable ranching projects**

The success of these interventions in reducing forest and biodiversity loss was measured by evaluating the increase in carrying capacity through improved pasture management and reduced deforestation rates, as a result of the reduction in pressure for new pastures upon surrounding forests. Jaguar conflicts and abundance were also evaluated, as was success in improving animal health and reproductive output through interviews and periodic blood and faecal sample analysis.

*Carrying capacity* in the participating ranches in Paraguay was considered synonymous to stocking rate and was determined visually and through ranch registries, both during baseline assessments and exit evaluations. In the case of the indigenous communities, three 1m<sup>2</sup> plots of ungrazed pasture were sampled between November 2016 and March 2017 in each of the three areas of improved pastures established in Alto Colorado, Puente Yucumo, and Tupili. In each plot, all the grass was cut and wet green matter was weighed using a portable hook scale. This exit evaluation was compared with unmanaged pastures.

*Mitigation of conflicts between carnivores and livestock* was evaluated through base line and exit interviews to record retaliatory killing of jaguars and cattle losses to wild predators. Retaliatory killing of jaguars in each private property and both indigenous lands was established through informal interviews and were sensitive because they are illegal in both Paraguay and Bolivia; monitoring of jaguar kills was thus triangulated with information of cattle losses to jaguar predation, also gathered through interviews.

*Deforestation* was evaluated in the Lecos and Tsimane Mosekene indigenous lands in Bolivia, using sensor to Landsat 5<sup>TM</sup> obtained from the database of the Instituto de Pesquisas Espaciais (INPE) for the period 2005- 2010 and Landsat 8 images for 2014-2016 from the Earth Explorer Server. We followed the basic procedures necessary to perform studies of loss of forest cover, including: Ortho rectification, atmospheric correction, and Non-Supervised classification for the seven scenes that cover the study area. All the processes were performed using Erdas Imagine software. In this way, we were able to compare the rate of deforestation during 2014-2016 between indigenous lands of intervention and outside them. In the case of the T'simane Mosekene indigenous land, we compared deforestation rates along a 4 km buffer either side of the road along the edge of the indigenous land, distinguishing between areas under indigenous management and surrounding areas. In the case of the Lecos indigenous land, such a comparison was not possible because the indigenous land is still in the process of land titling. Nevertheless, we extrapolated average deforestation rates in the municipal jurisdiction and projected these rates of forest loss onto the areas zoned for activities that are conserving forest within the Lecos indigenous land.

In the case of Paraguay, we evaluated our impact on deforestation rates by comparing forest loss within the areas of intervention with the rest of the region using a 2014-2016 deforestation analysis for the Paraguayan Chaco (Guyra, 2016).

*Animal health* was also evaluated through base line and exit evaluation of parasite load in fecal samples obtained from cattle held by indigenous communities. Faecal samples were conserved in plastic bottles with 10% formaldehyde and transported for laboratory analysis. Success in improving reproductive output was monitored through interviews with indigenous cattle owners in 2014 and 2016.

The impacts on conservation and development in these different scales of ranching practices were included in a technical document and three indigenous strategies for sustainable ranching. The documents were produced in a participatory manner and included feedback from the private ranchers, local municipal governments, and indigenous territorial organizations. The documents were presented in local, national, and tri-national events and also synthesized in a scientific article submitted to a peer reviewed journal, *Agricultural Systems*. Because of their distinct contexts, these provide an ideal setting in which to evaluate best practices for sustainable ranching at different scales.

#### **Output 4: Outreach materials**

In Paraguay, we developed a manual on sustainable farming and an accompanying brochure synthesizing the information to decision makers for presentation to individual private ranchers, municipal, national, and regional platforms, and interest groups. In Bolivia, we developed a separate manual targeting small-scale ranchers and shared it with municipal and national authorities, as well as academic and technical cooperation institutions. In both Paraguay and Bolivia, institutional alliances and networks allowed for broad dissemination of printed materials and digital versions.

#### **Output 5: Policy recommendations**

In Paraguay, a detailed compilation of development plans at the national level, agricultural sector plans, national wildlife strategies, and poverty relief strategies was carried out. The document was developed by former Minister of the Environment (2013-2015) Cristina Morales and includes suggested policy guidelines for the integration of sustainable farming techniques and land use planning processes in biodiversity strategies. Additionally, a methodological guide to improve municipal management through the “Delegation of Competencies” was developed and applied in the project intervention area. Results were widely shared with local municipalities and across the Chaco region. Widely applicable policy recommendations have also been shared through social networks, websites and partner institution networks.

In Bolivia, a review of the relevant national policies was carried out by the Association of Municipalities of Northern Tropical La Paz under joint and coordinated work with the participating municipalities of Ixiamas and Apolo. As a result, a strategic document on guidelines about application of sustainable cattle ranching activities has been proposed and agreed upon with stakeholders and local authorities in charge of development planning. Policy recommendations have been incorporated into the Apolo and Ixiamas territorial plans and have been shared across the other six municipalities belonging to the municipal association. Furthermore, the strategic municipal plans were presented by these municipalities to the Ministry of Planning. Additionally, the policy guidelines were also presented through the municipal authorities and producer organizations of Apolo and Ixiamas to the Rural Development Ministry and the Mother Earth National Authority. CIPLA and CRTM have developed a proposal to the Indigenous Fund of the Rural Development Ministry to support indigenous communities improve their practices through the use of rotational grazing. This experience with rotational grazing and pasture management by indigenous communities was presented in the XXI Congress of the Bolivian Association of Animal Production, ABOPA.

#### **4 Outcome**

*“Sustainable ranching techniques and land-use planning processes are successfully implemented in small-scale ranches in Bolivia and large-scale ranches in Paraguay and conservation and development impacts are rigorously evaluated and compared.”*

We believe this outcome was largely achieved based on the following evidence substantiated by the indicators and means of verification listed in Annex 2.

- During the project lifetime, 622 indigenous people in Bolivia (of the proposed 1000) and 422 rural people (of the proposed 200) in Paraguay directly participated in local municipal land use planning processes. Women’s participation was 56% in Paraguay and 20% in Bolivia. Satisfaction surveys showed 100% satisfaction in Paraguay, 61.6% satisfaction in Ixiamas, and 82% satisfaction in the Apolo municipality.
- 40,700 people in Bolivia and Paraguay indirectly benefit from the protection of important watersheds and ecosystem services on which they depend. The reduction of deforestation in Paraguay indirectly benefits 10,700 people, 4,211 in Fuerte Olimpo and 6,489 in Puerto Casado, through reduced impacts from deforestation on critical areas for ecosystem services and watersheds. In Bolivia, the municipalities of Apolo and Ixiamas, with a joint population of 30,000 people, benefit from the inclusion of information on critical watersheds and ecosystems. The difference with the 50,000 indirect beneficiaries originally expected is a result of the difficulties of engaging similarly with Carmelo Peralta in Paraguay.
- In Bolivia, 206 families (or around 1,030 people) in four communities received support for rotational grazing and improved the carrying capacity of their management areas between 338%-459%. This will translate into an equivalent increase in income in the next couple of years. In Paraguay, the six ranches that WCS staff could access regularly during the project



increased their sales of meat by 23%. Most management measures adopted will have full and more visible effect in the medium-long term.

- 84,439,57 hectares in Paraguay and 141,964 hectares in the Lecos, T'simane Mosekene and Tacana community lands have management plans and defined actions to improve ranching practices, and these are already being implemented.
- By the end of the project, we can conservatively claim the avoidance of deforestation of 3,644 hectares, less than the 9,000 hectares initially projected. This includes 1,398 hectares that would have been cleared under the average deforestation rate in the Chaco. In Bolivia, improved ranching practices prevented the loss of 92 hectares along the road on the edge of the T'simane Mosekene indigenous land between 2014-2016. In the case of the Apolo indigenous land, deforestation of 2,154 hectares was prevented between 2014 and 2016.
- No documented retaliatory killing of jaguars was reported during project implementation, from a baseline of 3-4 jaguar killings per property per year in Paraguay. Camera traps and GIS analysis show the importance of the interventions to maintain wildlife populations.

#### **4.1 Impact: achievement of positive impact on biodiversity and poverty alleviation**

*Impact statement from logframe:* Sustainable ranching techniques and land-use planning processes are successfully implemented across Latin America's lowlands, leading to a reduction in negative environmental impacts, and improved welfare and inclusion of vulnerable communities.

Sustainable ranching techniques and land use processes have been successfully implemented in Bolivia and Paraguay. With regard to land use planning, 422 rural people (57% women) in Paraguay participated in local municipal land use planning processes (Annex P2.1 and Annex P2.2). 100% of the surveyed people reported satisfaction of their involvement (Annex P2.2). In Bolivia, 622 indigenous people (20% women) participated in local municipal land use planning processes in the Apolo and Ixiamas municipalities (Annex B2.1). In the case of Ixiamas, 61.6% of people surveyed expressed satisfaction on the level of inclusion of their vision and local needs. In the case of Apolo, participants reported 82% satisfaction (Annex B2.2).

Implementation of sustainable ranching techniques reduced the negative environmental impacts of cattle ranching, in particular avoiding the loss of 3,644 hectares and leading to a reduction in deforestation and degradation of watersheds, as well as jaguar retaliatory killing (Annexes P1.3 and B1.3). The municipal planning processes and reduction of deforestation indirectly benefited 40,700 people. Meanwhile, 206 indigenous families benefitted from the introduction of rotational grazing systems and animal husbandry interventions, leading to increased carrying capacity, increased natality, and reduced mortality of cattle (Annex B1.2).

The project was implemented in two very different contexts in Paraguay and Bolivia. Because of their distinct contexts, these provided an ideal setting in which to evaluate best practices for sustainable ranching at different scales. In particular, we focused on how ranching practices can be improved to reduce land degradation and biodiversity loss by limiting the expansion of agricultural land, promoting the participation of vulnerable indigenous populations in governance platforms to guide sustainable development, and promoting sustainable agriculture. These results have been widely shared locally, nationally, and regionally, in the case of the Chaco. Additional resources have been leveraged and institutional networks have been used to facilitate replication (Annexes B.2.1, B.3.3, P3.1, P5.2, and P2.4).

## 5 Contribution to Darwin Initiative Programme Objectives

### 5.1 Contribution to Global Goals for Sustainable Development (SDGs)

Intensification of agricultural production reduced land degradation and biodiversity loss in areas managed by large private ranchers and those managed by small scale indigenous ranchers, and is therefore relevant to help achieve **SDG 15**.

Indigenous territorial rights and territorial management capacity in the Leco and T´simane Masetene indigenous lands reduced inequality **SDG 10** by empowering indigenous small-scale ranchers, and securing their equal access to land and natural resources. Indigenous participation in local municipal and protected area management platforms was possible because of the existence of legitimate indigenous organizations to represent the interests of their constituency. Indigenous land use plans and supporting natural resource use regulations established what land use practices are permissible, how access rights to collective resources are established, and what sanctions can be imposed for infractions of these regulations. These capacities allowed them to implement conservation and sustainable ranching plans, leading to improved productivity relevant for **SDG 2** and enabling them to leverage respect and support for their territorial management vision from protected area and municipal authorities. Their strong internal cohesion enabled them to engage in local governance platforms so that their territorial boundaries are respected and their conservation and natural resource management objectives, as expressed in their indigenous land use plans, are reflected in local development plans.

In the case of Paraguay, improved ranching practices have enabled positive results for conservation, but the limited progress in the recognition of indigenous territorial rights and more recent development of territorial planning capacity at the municipal level are obstacles to achieving greater co-benefits for social equity. The impact of improved ranching practices with large private ranchers resulted in greater impacts on the reduction of forest loss but impacts on social inclusion were only achieved in Bolivia due to the existence of indigenous territorial capacity. In order to reconcile cattle ranching with biodiversity and social inclusion objectives, efforts should focus on strengthening the capacity of small scale indigenous ranchers to implement improved management practices, and respecting and strengthening their internal legitimate decision making structures and social bridges with overlapping jurisdictions. In Paraguay, local government platforms to guide land use planning are an important gap that needs to be filled in order to achieve more inclusive development.

### 5.2 Project support to the Conventions or Treaties (CBD, CMS, CITES, Nagoya Protocol, ITPGRFA)

The project directly supported the *Convention on Biological Diversity* (CBD). WCS has a direct interaction with the focal points for the CBD of both Paraguay and Bolivia. WCS Paraguay has a signed cooperation agreement with the Ministry of Environment (SEAM), and WCS Bolivia has approved work plans with both the Ministry of the Environment and the National Protected Area Service (SERNAP). This Darwin Initiative project specifically contributes to the CBD’s Strategic Plan for Biological Diversity 2011-2020 and Aichi goals to “incorporate the needs and vision of local vulnerable groups in local planning processes” (Objective 14, Strategic Goal D: increase the benefits of biodiversity and ecosystem services for everyone.); and “capacity building, communication and outreach with such groups” (Objective 19, Strategic Goal E: participative planning, knowledge management an capacity building).

Indirectly, the project supported the Convention on the *Conservation of Migratory Species of Wild Animals* (CMS) through habitat conservation, but the project did not focus on any particular migratory species.

### **5.3 Project support to poverty alleviation**

The reduction of deforestation in Paraguay indirectly benefited the 10,700 people in the districts of Fuerte Olimpo and Puerto Casado. In Bolivia, the municipalities of Apolo and Ixiamas, with a joint population of 30,000 people, will benefit from the inclusion of information on critical watersheds and ecosystems. Therefore, a total of around 40,700 people received indirect benefits from the project.

In the Lecos Apolo indigenous land, the baseline community income from cattle ranching in the Tupili and Chirimayu communities was 21,000Bs or £2335 a year. After improving the pasture quality and introducing rotational grazing over 400 hectares of the collective grassland, we project an increased cattle production up to 71,009Bs or £7910, representing a 338% increase in community income. In the case of the T´simane Mosekene Indigenous land, the baseline in the Alto Colorado and Puente Yucumo communities was 12,600Bs a year, or £1405. After improving the pasture quality and introducing rotational grazing over 30 hectares we project income will increase to 57,912Bs or £6,456 per year, representing a 459% increase in income. Therefore, the 206 families, equivalent to around 1,030 people in the four communities which receive support for rotational grazing, improved their income between 338% and 459%.

Through the participation of the Leco and Tacana in the municipal development plans of Apolo and Ixiamas municipalities respectively, 6,700 indigenous people have been able to ensure inclusion of their indigenous land use plans. In the case of Paraguay, improved ranching practices have enabled positive results for conservation, but, more recent development of territorial planning capacity at the municipal level, and lack of recognition of indigenous land rights is an obstacle to achieving greater co-benefits for social equity. Nevertheless, we have promoted initial inclusions of local people from rural districts of Carmelo Peralta, Puerto Casado and Fuerte Olimpo (Paraguay) in the consultation and planning process on land use in their territories.

### **5.4 Gender equality**

In Paraguay, the project strongly supported participation of local women in the decision-making process on the use of their natural resources, as a direct measure to increase their empowerment and social inclusion. Women represented 48% of participants in meetings and interviews on land use (Stage 1) and 66% of participants in Stage 2 meetings and interviews. In Bolivia, indigenous women represented 20% of participants in local municipal land use planning processes in Apolo and Ixiamas municipalities. This difference is due to cultural differences in both countries, where indigenous people in this part of Bolivia still being based in communities whereas a higher percentage has been pushed to the urban centres in Paraguay.

In Apolo, WCS worked with the Lecos Apolo indigenous organization and the municipality of Apolo to develop a successful proposal for the Biocultura Program of the Swiss Cooperation and Ministry of the Environment. This project focuses on good husbandry practices for backyard animals and bee keeping in the Leco indigenous communities. This project is currently under implementation and was developed as a follow-up to WCS's training workshops on good husbandry practices for backyard animals, an activity that generally is under the responsibility of women as men mostly men conduct cattle management activities in the area. Therefore, complementing these activities with support for small animal management ensures broader participation of women and consequently, a larger impact on poverty alleviation.

## 5.5 Programme indicators

- The project led to greater participation of local poor people in local land use planning processes, which included biodiversity and ecosystem components. This was carried out in Bolivia in the Ixiamas and Apolo municipalities and in Paraguay in Carmelo Peralta, Fuerte Olimpo and Puerto Casado.
- Management plans for biodiversity were not developed, but the municipal development plans of Ixiamas and Apolo, which include the identification of priority biodiversity actions, were formally accepted.
- The municipal development plans of Apolo and Ixiamas were participatory, included indigenous territorial organizations and involved their legitimate representatives in joint agreements between the municipal authorities and national authorities to support joint implementation of conservation and development activities. Participants in the consultation and diagnostic events included 20% women. Nevertheless, a complementary project focusing on women's livelihoods was jointly prioritized for implementation between the municipal government of Apolo, the Lecos Apolo indigenous organization, and WCS.
- 206 families benefitted directly from a 338-459% increase in annual income as a result of increases in reproductive productivity due to increased natality and reduced mortality, a threefold increase in carrying capacity in the lowlands, and a 35-fold increase in carrying capacity at mid elevations. This percentage income increase was measured by contrasting carrying capacity in four community pastures with a baseline and exit survey.

## 5.6 Transfer of knowledge

This Darwin project has produced four publications with important coverage across the Chaco region:

1. Manual on Best Farming Practices, which is available at WCS Paraguay website [here](#).
2. A simplified brochure version tailored to a more diverse audience (Annex P4.2); and a Guide for Better Municipal Management, [here](#).
3. A consultancy report: "Policy Guidelines for the integration of sustainable farming techniques and land use processes into biodiversity strategies", available at WCS Paraguay's website [here](#).
4. A manual for the sustainable ranching for the small-scale cattle ranchers in indigenous communities of Bolivia was produced in a participatory way as part of the capacity building strategy, recovering the experiences gained during the capacity training events. The manual was printed (300 units) and distributed among project beneficiaries and local authorities, as well as governmental institutions. It is available through our website [here](#).

WCS held several meetings at the transboundary level, in Paraguay, Argentina, and Bolivia within the framework of other regional initiatives, and shared the findings of the project. In the case of Bolivia, WCS presented project results in the XXI Congress of ABOPA (Bolivian Association of Animal Production) held in Cochabamba in 2016.

## 5.7 Capacity building

In Paraguay, WCS has become a leader and a reference in promoting sustainable ranching practices in the Chaco region. As a result, WCS Paraguay has been invited to be part of the Driving Committee for the creation of a tri-national biosphere reserve in the Pilcomayo watershed, between the borders of Bolivia, Argentina, and Paraguay in the South American Chaco. This committee has the objective of elaborating and justifying the proposal for an area of shared management between the three

countries (Annex P5.3). Participation in this committee has been an opportunity for Angel Brusquetti, Field Manager with WCS Paraguay, to further develop his network of regional contacts. WCS is also part of the Chaco Tri-national Initiative, PROADAPT project and the alliance of four Central Chaco municipalities, which foster alliances for the strengthening of local governments. Participation in these platforms by Laura Villalba, WCS Consultant in Territorial Management and Maria del Carmen Fleytas, WCS Paraguay Office Director have enabled them to develop a leadership role linked to their expertise on reconciling conservation and sustainable ranching interests.

In Bolivia, eight veterinary students, five of them women, were able to obtain practical experience and conduct research on animal health and husbandry for ~20 weeks or 5 months each. This allowed them to fulfil the requirements of the veterinary medicine undergraduate program, and one of the female students went on to develop her Bachelor thesis.

## **6 Sustainability and Legacy**

To provide a sustained legacy, the project focused on showing livelihood and conservation benefits to engage the interest and commitment of local, national, and regional stakeholders. The principal strategy for ensuring a sustained legacy was threefold: 1) providing technical recommendations to be incorporated into policy at the local, national and regional scale; 2) providing technical capacity to promote sustainable ranching practices that reconcile poverty alleviation and biodiversity conservation objectives; and 3) documenting and communicating both the inclusive land use planning processes and the sustainable ranching practices.

We made efforts to promote our work at multiple levels: we visited and present the project at the national level to the Ministry of Environment in Paraguay, as well as at the local level to grass roots organizations in Bolivia and municipal authorities in both countries. We have also established an agreement with the National Livestock Breeding Program of Beni, Bolivia through the Universidad Autónoma del Beni. We have made efforts to document all the processes and have developed materials for replication. In the last period of the project, we focused on sharing knowledge and lessons learned widely through technical documents, policy recommendations based on project results and analysis of impacts on biodiversity and poverty alleviation and on developing a manuscript for submission to a peer reviewed journal. In Bolivia, additional funds have been leveraged by both WCS and the indigenous partners, and these funds will allow continuity of staff and consolidation of the project impact.

WCS Paraguay has the Chaco region as its only focal landscape and will continue working in the area, both with municipal governments and private ranchers. WCS Paraguay is committed to continue working at the tri-national level, and for that purpose, is facilitating the establishment of a transversal alliance for more sustainable economic development in the Chaco, through the adoption of more sustainable cattle ranching practices and actions to tackle climate change at the landscape level.

## **7 Lessons learned**

The effort required for organizational strengthening of rural productive associations and engagement with policy cycles at the local and national levels must not be underestimated. In order for results to become institutionalized locally, they must respond to the appropriate planning instruments, even when these must adapt because of changes in legislation. Technical diagnostics are necessary in any planning process and can be adjusted rapidly. Small indigenous cattle ranchers need to collaborate to improve their practices, but this requires a change in culture from a previously individually held resource (cattle) to that of a collectively held resource (pasture). Developing local municipal capacity for territorial management requires long-term commitments, extending over 6-10 years; nevertheless,

important steps can be taken towards generating information and providing guidance for institutionalizing more democratic land use planning processes. To reconcile cattle ranching with biodiversity and social inclusion objectives, efforts should focus on strengthening the capacity of small scale indigenous ranchers to implement improved management practices, and respecting and strengthening their internal legitimate decision making structures and social bridges with overlapping jurisdictions. In Paraguay, local government platforms to guide land use planning are an important gap that needs to be filled in order to achieve more inclusive development.

Finally, in the case of Paraguay, even when we planned for long periods of heavy rain, the current weather conditions were much worse and took longer than we expected. As a consequence, the bad conditions of dirt roads prevented us to completely deliver the planned assistance to some ranches and municipalities.

## **7.1 Monitoring and evaluation**

The legacy of the project is a robust evaluation and comparison of the relative effectiveness of sustainable ranching interventions in different contexts, which will help conservation and development organizations and host country governments promote sustainable ranching across Latin America. Therefore, monitoring and evaluation were particularly important for this project in order to demonstrate results and promote adoption of sustainable practices. To assess progress, we used primarily indicators at the output level, such as generation of documents, surveys, interviews, lists of workshop participants, zoning maps, camera trap surveys, and others, and collected baseline data for all outcome level indicators. Based on that information, we have assessed the final impact on biodiversity, poverty, and changes in attitudes towards improved resource management that are detailed throughout this report. The results show that reconciliation of cattle ranching with biodiversity and social inclusion objectives is possible both in large private properties in Paraguay and collective indigenous lands in Bolivia.

## **7.2 Actions taken in response to annual report reviews**

- The internal difficulties in Carmelo Peralta affected the number of people benefitting from the protection of important watersheds and ecosystem services that they depend on.
- A three-month extension was required for Output 3 because it took more time to evaluate impacts on productivity and write up these assessments. These delays were discussed with indigenous partners in Bolivia.

## **8 Darwin identity**

In Paraguay, WCS printed a banner to use at training events, showing the Darwin Initiative logo next to the WCS logo and explaining at each event the project support to local initiatives that combine biodiversity conservation and poverty reduction. All the furniture, computers, and equipment provided to Puerto Casado Municipality with Darwin funds were also similarly marked. The Darwin Newsletter featuring an article on this project was posted on WCS Paraguay's [Facebook page](#).

In Bolivia, meetings were convened under the branding of one of the indigenous organizations or the municipal governments. However, all maps, reports and manuals developed by the project used the Darwin logo, and WCS Bolivia webpage acknowledged Darwin's support. <https://bolivia.wcs.org/es-es/Iniciativas/Medicina-veterinaria/Ganader%C3%ADa-sostenible.aspx>

The Darwin Initiative is well known by NGOs and central government biodiversity staff. However, at the local level, municipal governments and indigenous organizations are less familiar with the

objectives and mechanisms of the Darwin Initiative. The last six months of the project were also focused on communication of results and leveraging these to the policy level, presenting an opportunity to increase awareness of the Darwin identity.

## 9 Finance and administration

### 9.1 Project expenditure

Project spend (indicative) since last annual report	2016/17 Grant (£)	2016/17 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			5	n/a
Consultancy costs			-7	n/a
Overhead Costs			-6	n/a
Travel and subsistence			-9.5	n/a
Operating Costs			-8.0	n/a
Capital items (see below)			-	n/a
Others (see below)			2	n/a
<b>TOTAL</b>	51,837	51,837		

Staff employed (Name and position)	Cost (£)
Project Lead- Lilian Painter	
WCS Bolivia Financial Manager-Linda Rosas	
WCS Bolivia GIS expert- Ariel Reinaga	
Bolivia Sustainable Ranching- Rodolfo Nallar	
Project Lead (Paraguay)-Maria del C. Fleytas	
Paraguay Sustainable Ranching Coordinator-Angel Brusquetti	
Paraguay GIS Expert- Violeta Berdejo	
WCS Paraguay Financial Manager- D. Raichakowski	
<b>TOTAL</b>	<b>28,168</b>

Capital items – description	Capital items – cost (£)
<b>TOTAL</b>	

Other items – description	Other items – cost (£)

Printing	
ISBN registration	
<b>TOTAL</b>	<b>1,469</b>

## 9.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Gordon and Betty Moore Foundation	
MacArthur Foundation	
Use of Toyota Landcruiser, Bolivia	
Use of Nissan Frontier 4WD truck	
Office space and field equipment	
Plotters and GIS software and satellite imagery	
Use of Computers, GPS and other equipment	
DANIDA- FOSC Programme	
<b>TOTAL</b>	<b>539,022</b>

Source of funding for additional work after project lifetime	Total (£)
DANIDA -FOSC	
Gordon and Betty Moore Moore Foundation	
<b>TOTAL</b>	<b>150,000</b>

## 9.3 Value for Money

WCS consistently prioritizes efficiency and value for money in our conservation and sustainable development field programs. At every decision point in developing the field budget, we have considered cost effectiveness alternatives. WCS has provided much of the basic infrastructure (i.e. office space, office equipment, vehicles), thereby maximizing the impact of the Darwin funding. We also used Darwin funding to leverage additional funding, with 64% of the project's total direct cost being covered by other partners, including WCS itself. WCS Bolivia's success in leveraging additional funding from DANIDA is an important accomplishment; it will support territorial management and productive activities that reduce forest loss, including sustainable ranching. This funding will complement the Darwin project by helping to strengthen local livelihoods and supporting the establishment of sound environmental policy. We have also encouraged local governments to make additional investments; in Puerto Casado Municipality (Paraguay), the project provided the equipment and training for the Environmental Technical Unit and the municipality contributed with the provisioning of Internet required to remotely monitor natural resources in their territory.

WCS used the technical expertise acquired by its staff in previous projects and minimized the hiring of external human resources, except in the case of two consultants to provide legal expertise for land use planning processes. The Project Lead in Bolivia and Project Coordinator in Paraguay are both women and host country nationals, whose time was covered only partially by Darwin. All other project staff was hired locally.

206 families, representing approximately 1030 indigenous Leco and Tacana people, have benefitted directly from implementation through a 2.23% increase in reproductive productivity resulting from increased natality and reduced mortality and the fold increase in carrying capacity in the lowlands



and 35-fold increase in carrying capacity at mid elevations. This represents a 338-459% increase in annual income, for a total annual investment of £96 per person. The reduction of deforestation by an estimated 3,654 hectares represents an investment of £81 pounds from the Darwin Initiative per hectare over the course of the project.

## Annex 1 Project's original (or most recently approved) logframe, including indicators, means of verification and assumptions.

Note: Insert your full logframe. If your logframe was changed since your Stage 2 application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the Stage 2 logframe.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<b>Impact:</b> Sustainable ranching techniques and land-use planning processes are successfully implemented across Latin America's lowlands, leading to a reduction in negative environmental impacts, and improved welfare and inclusion of vulnerable communities.			
<b>OUTCOME:</b> Sustainable ranching techniques and land-use planning processes are successfully implemented in small-scale ranches in Bolivia and large-scale ranches in Paraguay and conservation and development impacts are rigorously evaluated and compared.	1. During the project lifetime, 1000+ indigenous people in Bolivia and 200 rural people in Paraguay (30% of whom are women) will have directly participated in local municipal land use planning processes. At least 60% of sampled participants report satisfaction with inclusion of their vision and local needs in decision-making processes.	Pre- and post-interview data with members of vulnerable communities and their representative organizations to evaluate their satisfaction with participation in local land use planning processes; local land use planning processes reflecting the territorial vision and integrating local livelihood concerns of vulnerable communities; attendance lists from participatory land use workshops and meetings; minutes of participatory evaluation meetings with ranchers, indigenous territorial organizations and municipal authorities.	1. Extreme climatic conditions such as droughts or disease outbreaks will not require emergency actions by ranchers, taking up all of their available time and resources.  2. Political instability in local municipal governments or within indigenous territorial organizations will not inhibit their capacity to convene and participate in democratic consultation processes. If this occurs, we will work through civil society organizations.  3. Systematization and dissemination of lessons learned will encourage replication of sustainable ranching activities, thus expanding the impact of the project.  4. Governments and other authorities will be receptive to policy recommendations.
	2. Over 50,000 people in Bolivia and Paraguay will indirectly benefit from the protection of important watersheds and ecosystem services that they depend on.	Number of hectares under improved management; maps showing critical watersheds and natural resource use areas.	
	3. By the end of the project 800 local people (~200 families) will directly benefit from a 40% increase* in income as a result of increased livestock productivity and improved land management.	Rancher surveys; livestock mortality; calving rate; time to market; records of livestock sales from rancher logs.	
	4. By the end of the project, 170,000+ hectares in a mosaic landscape of ranch lands, grasslands and globally significant forests, will be under improved management.	Project reports and GIS analysis showing the number of ranchers using improved practices and number of hectares under improved management; rancher logs documenting use of improved practices; ranch zoning plans and blueprints of land-use plans.	
	5. By the end of the project 9,000+ hectares* of forest cover will be maintained that – without intervention – would likely have been deforested for cattle ranching.	Land change model projections using historical deforestation trends derived from remote sensing analysis as contrasted with actual changes during project duration; ranch zoning plans and land-use plans indicating protected areas.	
	6. By the end of the project, documented retaliatory killing of jaguars and illegal hunting of peccaries, tapir and deer will have been reduced by 50% in target sites.	Interviews with local ranchers and personnel to register wildlife hunting events; camera trap wildlife monitoring data in select ranches and community managed areas to independently verify interview data.	
<b>OUTPUTS</b>	1.1.Ranch management plans are developed and approved by 8 large-scale ranches and 12 communities of small-scale ranches, in consultation with ranchers and their families by year 1.	Ranch management plans; notes of meetings with ranchers.	Ranchers and vulnerable communities will be interested and incentivized

<b>1: 20 projects to improve livestock management</b>	1.2.Sustainable ranching techniques* are adopted and implemented by ranchers, with technical assistance from WCS, by year 3.	Field visit reports and photos; rancher logs documenting use of improved practices.	to participate in project activities.
	1.3.Ranchers report improved productivity and reduced losses by year 3.	Rancher surveys; livestock mortality; calving rate; time to market; records of livestock sales from rancher logs.	
	1.4. Forest loss, retaliatory killing of jaguars, and illegal hunting of ungulates are reduced by year 3.	Field visit reports and photos; GIS analysis of forest change, recorded events of hunting events; interviews with ranchers and personnel; camera trap photos.	
<b>2: 5 blueprints for municipal land use plans and 8 ranch zoning plans</b>	2.1. Land use planning meetings (stage 1) involving over 1200 community members are held in all 5 municipalities by year 3.	Minutes and attendance lists of participatory meetings.	During land use planning processes, due consideration will be given to all stakeholder viewpoints.
	2.2. Land use planning meetings (stage 2) involving all relevant stakeholders – including community representatives – are held in all 5 municipalities by year 3.		
	2.3. Critical watersheds and community natural resource use areas are identified to guide land use planning processes.	Maps identifying critical areas for conservation; minutes of participatory meetings; land use plans.	
	2.4. Information and maps are synthesized and 5 blueprints to guide the development of municipal land use plans are completed.	Land use plans; municipal diagnostics, annual plans or by-laws.	
	2.5. At least 1 municipal diagnostic, annual plan or municipal by-law related to sustainable land use is developed in each of the 5 municipalities by year 3.	Interviews with community participants in land-use planning meetings; blueprints for municipal land use plans.	
	2.6. At least 60% of sampled participants report satisfaction with inclusion of their vision and local needs in municipal diagnostic, annual plan or municipal by-laws.	Ranch zoning plans; notes of meetings with ranchers.	
	2.7. Ranch zoning plans are developed and approved for 8 large, private ranches, in close consultation with ranchers by year 1.	Landsat images; blueprints for municipal land use plans; ranch zoning plans.	
<b>3: Report on the impacts of sustainable ranching projects</b>	3.1. Conservation and development impacts are rigorously analysed and compared at different ranching scales.	Data analysis; working paper draft.	Projects will be successful in increasing income, improving inclusion in decision-making processes, and mitigating environmental harm
	3.2. Working paper outlining the effectiveness of sustainable ranching interventions is drafted by year 3.		
	3.3. Project results are presented to all 5 participating municipalities during last two quarters of project.	Minutes of meetings with municipalities and stakeholders; evaluation reports from the 5 municipalities.	

	3.4. Feedback from the municipalities is incorporated, and a technical white paper is completed by year 3.	Revised working paper draft.	Results from this project will be applicable and scalable to other similar contexts within lowlands in Latin America.
	3.5. White paper is tailored to a scientific audience and peer-reviewed scientific journal article on the conservation and development impacts of interventions at different ranching scales is submitted for publication by year 3.	Submission or acceptance letter of peer-reviewed article.	
<b>4: Outreach materials</b>	4.1. Manual on sustainable ranching is developed by year 3.	Sustainable ranching manual.	Outreach materials will be effective in reaching intended audiences.
	4.2. Manual on sustainable ranching is uniquely tailored for different audiences (e.g. agriculture government authorities, NGOs) and different mediums of distribution (e.g. social networks, websites, print) by year 3.	Digital manuals; print manuals; social networks; websites.	
<b>5: Policy Recommendations</b>	5.1. Policy recommendations for scaling up sustainable ranching interventions are developed.	List of recommendations for municipal and national authorities.	Policy recommendations will be given due consideration by decision-makers.
	5.2. Policy recommendations are shared directly with municipalities and national government entities in Bolivia and Paraguay.	Meeting minutes; photos of policy sharing events.	
	5.3. Policy guidelines for integrating sustainable ranching techniques and land-use planning processes into national and regional biodiversity and poverty alleviation strategies are developed and distributed.	Policy guidelines; direct communications with government officials.	

**Activities** (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)

**Output 1**

1.1. Conduct interviews with ranchers to identify critical obstacles to implement improved practices.

1.2. Develop specific sustainable cattle management recommendations in consensus with ranchers.

1.3. Formalize recommendations through ranch management plans that ranchers commit to.

1.4. Implement a technical assistance program to support implementation of the sustainable cattle management plans.

**Output 2**

2.1. Facilitate stage 1 land use planning meetings, involving over 1200 community members are held in all 5 municipalities.

2.2. Facilitate stage 2 land use planning meetings involving all stakeholder in all 5 municipalities.

2.3. Conduct interviews with a representative sample of community participants to gauge satisfaction with participatory processes and adapt accordingly.

2.4. Complete blueprints to guide the development of land use plans, based on what has been agreed upon in the land use planning meetings.

2.5. Facilitate the process to sign a municipal diagnostic, annual plan or municipal by-law, in each of the 5 municipalities.

**Output 3**

3.1. Conduct pre- and post- project surveys on livestock mortality, calving rate, off-take data, and income derived from livestock production.

3.2. Annually monitor land use change, deforestation, and densities of target wildlife species in project intervention areas.

3.3. Conduct data analysis of the impacts of interventions on conservation and development.

3.4 Hold workshops with the participating municipalities, community groups, and indigenous organizations to discuss results and get feedback.
3.5 Complete technical white paper.
3.6 Write and submit peer-reviewed scientific article for publication.
<b>Output 4</b>
4.1 Develop a manual on sustainable ranching.
4.2 Tailor the manual to different audiences.
4.3 Present manual to local authorities, NGOs, and biodiversity and agriculture national government institutions.
4.4 Share manual in electronic form on social networks, websites and partner institution networks.
<b>Output 5</b>
5.1 Conduct a thorough review of the national development plans, agriculture sector plans, national biodiversity strategies, and poverty alleviation strategies of Bolivia and Paraguay.
5.2 Draft policy recommendations for implementation of sustainable ranching practices and participatory land use processes at the national level, for both Bolivia and Paraguay.
5.3 Finalize policy recommendations, in consultation with the 5 participating municipal governments and national biodiversity and agricultural sector government authorities.
5.4 Submit policy recommendations to national government entities in Bolivia and Paraguay.
5.5 Share general, widely applicable policy recommendations through social networks, websites and partner institution networks, with the goal of reaching similar contexts in Latin America and beyond.

## Annex 2 Report of progress and achievements against final project log frame for the life of the project

Project summary	Measurable Indicators	Progress and Achievements
<p><b>Impact</b> Sustainable ranching techniques and land-use planning processes are successfully implemented across Latin America's lowlands, leading to a reduction in negative environmental impacts, and improved welfare and inclusion of vulnerable communities.</p>		<p>The project was implemented in two very different contexts in Paraguay and Bolivia. Because of their distinct contexts these provide an ideal setting in which to evaluate best practices for sustainable ranching at different scales. In particular, how ranching practices can be improved to reduce land degradation and biodiversity loss by limiting the expansion of agricultural land, promote the participation of vulnerable indigenous populations in governance platforms to guide sustainable development and promoting sustainable agriculture.</p>
<p><b>Outcome</b> Sustainable ranching techniques and land-use planning processes are successfully implemented in small-scale ranches in Bolivia and large-scale ranches in Paraguay and conservation and development impacts are rigorously evaluated and compared.</p>	<p>During the project lifetime, 1000+ indigenous people in Bolivia and 200 rural people in Paraguay (30% of whom are women) will have directly participated in local municipal land use planning processes. At least 60% of sampled participants report satisfaction with inclusion of their vision and local needs in decision-making processes.</p>	<p>422 (57% women) rural people in Paraguay participated in local municipal land use planning processes (Annex P2.1 and Annex P2.2). 100% of the surveyed people reported satisfaction of their involvement (Annex P2.2). In Bolivia, 622 (20% women) indigenous people participated in local municipal land use planning processes in Apolo and Ixiamas municipalities (Annex B2.1). In the case of Ixiamas 61.6% of people surveyed expressed satisfaction on the level of inclusion of their vision and local needs. In the case of Apolo participants reported 82% satisfaction (Annex B2.2).</p>
	<p>Over 50,000 people in Bolivia and Paraguay will indirectly benefit from the protection of important watersheds and ecosystem services that they depend on.</p>	<p>The reduction of deforestation in Paraguay will indirectly benefit the 10,700 people in the districts of Fuerte Olimpo and Puerto Casado. In Bolivia the municipalities of Apolo and Ixiamas with a joint population of 30,000 people will benefit from the inclusion of information on critical watersheds and ecosystems. Therefore, a total of around 40,700 people benefitted indirectly. The difference in indirect beneficiaries is a result of the difficulties of engaging similarly with Carmelo Peralta in Paraguay.</p>
	<p>By the end of the project, 800 local people (~200 families) will directly benefit from a 40% increase in income as a result of increased livestock productivity and improved land management.</p>	<p>Thanks to technical assistance and ranch management plans developed by the project together with landowners, the 6 private ranches that WCS staff could access regularly during the project increased their sales in 23% (Annex P1.2.) In Bolivia, during the life of the project, a total of 206 Lecos and Tsimane Mosekene families, equivalent to around 1030 people improved their income between 338% and 459% (Annex B1.2)</p>
	<p>By the end of the project, 170,000+ hectares in a mosaic landscape of ranch lands, grasslands and globally significant forests, will be under improved management.</p>	<p>From the initially targeted 93,004 hectares of 8 ranches, we could finally impact the conservation of forests and install measures towards an improved management in 84,439,57 hectares of 6 properties (Annex P2.3. and Annex P1.3.) In Bolivia, a total of 141,964 hectares of Lecos, Tsimane Mosekene and Tacana community lands in (Bolivia) have management plans and defined actions to improve ranching practices, which are being prioritized and implemented (Annex B1.1)</p>

	By the end of the project 9,000+ hectares* of forest cover will be maintained without intervention, and that would likely have been deforested for cattle ranching.	In Paraguay, we can conservatively claim the avoidance of deforestation of 1,398 hectares that would have been cleared under the average deforestation rate in the Chaco (Annex P1.3.) In Bolivia, improved ranching practices prevented the loss of 92 hectares along the road on the edge of the T'simane Mosekene indigenous land between 2014 and 2016. In the case of the Apolo indigenous land deforestation of 2,154 hectares were prevented between 2014 and 2016 (Annex B1.3)
	By the end of the project, documented retaliatory killing of jaguars and illegal hunting of peccaries, tapir and deer will have been reduced by 50% in target sites.	No jaguar killings were reported or detected during the project implementation. Baseline interviews in Paraguay reported 3-4 jaguar killings per property. Camera trap surveys showed healthy wildlife populations in Paraguay (Annex P1.4). In the case of the indigenous communities in Bolivia, focus was placed on conserving wildlife corridors (Annex B1.4) and no retaliatory hunting of jaguar was reported or observed during project implementation.
<b>Output 1.</b> 20 projects to improve livestock management, benefitting 800 people and covering 170,000 hectares across Bolivia and Paraguay.	<b>Indicator 1.1</b> Ranch management plans are developed and approved by 8 large-scale ranches and 12 communities of small-scale ranches, in consultation with ranchers and their families by year 1.	Plans for a more sustainable cattle management were developed and implemented, specifically tailored for each site, in close collaboration with 8 large scale ranches (Annex P1.1.) In the case of 17 indigenous communities work plans and intervention maps have been developed for each of the three indigenous lands (Annex B1.1).
	<b>Indicator 1.2</b> Sustainable ranching techniques are adopted and implemented by ranchers, with technical assistance from WCS, by year 3.	The private owners and communities, except for two private ranchers who have had access to their lands cut by rains, adopted recommendations as reflected by the positive environmental impacts shown in other parts of this report. (Annex P1.2.; Annex P1.3.; Annex P1.4.).  During the project, a total of 17 communities (12 CIPLA, 3 CIPTA, 2 CRTM) participated in training and adopted the cattle sanitary calendar. 7 communities included in their animal management system the new techniques and improvements provided by the Project (Annex B1.2)
	<b>Indicator 1.3</b> Ranchers report improved productivity and reduced losses by year 3.	In Paraguay, livestock mortality rates decreased from an initial average of 2.98% to 2.48%, and calving rate went from an initial 17.83% to a final 20.16%, this is, 2.33% increase, showing the smaller ranches a more accentuated improvement, all of which was thanks to technical assistance packages focused on shifting their traditional practices towards more environmentally friendly practices.  In Bolivia, as a result of the training provided to the small-scale ranchers on pasture management, there was increase in grass offer and calf survival rate as indicators of the improved productivity and a decrease in mortality. Results of the intervention show increasing stoking rate and reduced calving mortality (Annex B1.2).

	<p><b>Indicator 1.4</b> Forest loss, retaliatory killing of jaguars and illegal hunting of ungulates are reduced by year 3.</p>	<p>In Paraguay, we can conservatively claim the avoidance of deforestation of 1,398 hectares that would have been cleared under the average deforestation rate in the Chaco (Annex P1.3.).</p> <p>In Bolivia, improved ranching practices prevented the loss of 92 hectares along the road on the edge of the T'simane Mosekene indigenous land between 2014 and 2016. In the case of the Apolo indigenous land deforestation of 2,154 hectares were prevented between 2014 and 2016 (Annex B 1.3)</p> <p>No jaguar killings were reported or detected during the project implementation. Baseline interviews in Paraguay reported 3-4 jaguar killings per property, and this was reduced after cattle mortality attributed to jaguars was also reduced through the installation of conflict mitigation techniques (Annex P1.2. and Annex P1.7.). Camera trap surveys showed healthy wildlife populations in Paraguay. In the case of the indigenous communities in Bolivia, focus was placed on conserving wildlife corridors (Annex B1.4) and no retaliatory hunting of jaguar was reported or observed during project implementation.</p>
<p><b>Activity 1.1</b> Conduct interviews with ranchers to identify critical obstacles to implement improved practices.</p>		<p><b>Bolivia:</b> Interviews were conducted and workshops were held in 17 indigenous communities (12 communities of the Lecos Apolo indigenous Territory, 3 communities of the Tacana Indigenous Land, and 2 in the T'simane Moseken indigenous territory) (Annex B1.1)</p> <p><b>Paraguay:</b> Initial surveys and interviews were conducted in 8 properties in the Northern Paraguayan Chaco (Annex P1.2).</p>
<p><b>Activity 1.2</b> Develop specific sustainable cattle management recommendations in consensus with ranchers.</p>		<p><b>Bolivia:</b> In consultation with the small-scale indigenous ranchers, a teaching package on sustainable cattle management was developed and organized in the form of five training units (Annex B1.2).</p> <p><b>Paraguay:</b> Specific management recommendations were developed for 8 private ranches (Annex P1.1).</p>
<p><b>Activity 1.3</b> Formalize recommendations through ranch management plans that ranchers commit to.</p>		<p><b>Bolivia:</b> 3 cattle management plans for three indigenous lands and 17 communities within them, have been developed and indigenous territorial organizations and their communities have committed to them (Annex B1.2).</p> <p><b>Paraguay:</b> 8 ranch management plans were formalized (Annex P1.1).</p>
<p><b>Activity 1.4</b> Implement a technical assistance program to support implementation of the sustainable cattle management plans.</p>		<p><b>Bolivia:</b> Five training modules were designed and implemented (Annex B1.2).</p> <p><b>Paraguay:</b> Technical assistance was developed according to the specific needs of each property. (Annex P1.6).</p>
<p><b>Output 2.</b> 5 blueprints for municipal land use plans and 8 ranch zoning plans developed with the participation of 1200+ local people across Bolivia and Paraguay.</p>	<p><b>Indicator 2.1</b> Land use planning meetings (stage 1) involving over 1,200 community members are held in all 5 municipalities by year 3.</p>	<p>This indicator was achieved through the development of thirty (30) structured interviews with key actors and 5 workshops, involving a total of 218 people of the three Paraguay districts, of which 48% were women, about land use planning and participatory processes, setting an important basis for community inclusion in municipal plans for the use of their territories (Annex P2.1)</p> <p>Land use planning meetings involved 510 people in Ixiamas and 112 people in Apolo municipalities (Annex B2.1).</p>



<p><b>Indicator 2.2</b> Land use planning meetings (stage 2) involving all relevant stakeholders – including community representatives – are held in all 5 municipalities by year 3.</p>	<p>Community workshops on land use planning were held with the participation of more than 204 people in the 3 municipalities of Paraguay, of which 134 (66%) were women (Annex P2.2). In Bolivia, planning meetings involving relevant stakeholders were held in the Apolo and Ixiamas municipality (Annexes B2.1 and B2.2).</p>
<p><b>Indicator 2.3</b> Critical watersheds and community natural resource use areas are identified to guide land use planning processes.</p>	<p>In Paraguay, this indicator was fully achieved at an early stage of the project, as baseline maps were elaborated in close consultation with the owners, identifying critical areas and natural communities within the 8 focal properties (Annex P2.3). In Bolivia, baseline maps showing critical watershed and key areas for conservation of biodiversity were developed for the Ixiamas and Apolo municipalities, which were incorporated into the municipal development plans, the PDM for Ixiamas, and PTDI for Apolo (Annex B2.1).</p>
<p><b>Indicator 2.4</b> Information and maps are synthesized and 5 blueprints to guide the development of municipal land use plans are completed.</p>	<p>In Paraguay, a guide for the effective implementation of the process of “Delegation of competencies” in municipalities was developed (Annex P2.4). To further support this effort, a technical unit was equipped and municipal staff was trained in Puerto Casado to fulfill the environmental monitoring task (Annex P2.6)</p> <p>In Bolivia information and maps have been synthesized and presented to both municipalities, Ixiamas and Apolo, as part of the development of their municipal development plans, which are now under implementation (Annex B2.1).</p>
<p><b>Indicator 2.5</b> At least 1 municipal diagnostic, annual plan or municipal by-law related to sustainable land use is developed in each of the 5 municipalities by year 3.</p>	<p>The municipalities of Puerto Casado and Fuerte Olimpio in Paraguay developed two legal regulations each (Annexes P2.7 and P2.8; Annexes P2.9 and P2.10). In Bolivia, both Apolo and Ixiamas municipal governments have signed an agreement with the Mother Earth Authority (APMT) to support sustainable natural resource use and forest conservation (Annex B 2.5). Additionally, Apolo Municipality and Ixiamas Municipality developed their Municipal Development Plans with support from the project and both were approved by their Municipal Councils (Annex B2.1).</p>
<p><b>Indicator 2.6</b> At least 60% of sampled participants report satisfaction with inclusion of their vision and local needs in municipal diagnostic, annual plan or municipal by-laws.</p>	<p>In Paraguay 100% of the sampled participants reported satisfaction with their participation in local land use planning processes and consultation (Annex P2.1. and P2.2). In Bolivia, participants in Ixiamas and Apolo reported 61.6% and 82% satisfaction in the inclusion of their vision and local needs in the municipal development plans (Annex B2.2).</p>
<p><b>Indicator 2.7</b> Ranch zoning plans are developed and approved for 8 large, private ranches, in close consultation with ranchers, by year 1.</p>	<p>Based on maps on historical and current land uses and technical recommendations 8 ranch zoning plans were made in consensus with the landowners (Annex P2.3. and Annex P1.1).</p>

<p><b>Activity 2.1</b> Facilitate stage 1 land use planning meetings, involving over 1,200 community members are held in all 5 municipalities.</p>	<p>Thirty structured interviews with key actors and 5 workshops on land use planning and participatory processes were conducted, involving a total of 218 people of the three Paraguay districts, of which 48% were women, (Annex P2.1). In Bolivia, WCS provided input to the Municipal Development Plans of Ixiamas and Apolo. A total of 622 people participated (Annex B.2.1)</p>						
<p><b>Activity 2.2</b> Facilitate stage 2 land use planning meetings involving all stakeholders in all 5 municipalities.</p>	<p>204 people participated in the second round of workshops of land use planning in the 3 municipalities of Paraguay, of which 134 (66%) were women. These workshops involved all relevant stakeholders in each territory (Annex P2.2). In Bolivia, these planning meetings were not separated in two stages.</p>						
<p><b>Activity 2.3</b> Conduct interviews with a representative sample of community participants to gauge satisfaction with participatory processes and adapt accordingly.</p>	<p>In Paraguay, 100% satisfaction was expressed by the community participants from the 3 municipalities (Annex P2.2.). In Bolivia, participants from Ixiamas reported a 61.6% satisfaction and those from Apolo 82% satisfaction (Annex B2.2).</p>						
<p><b>Activity 2.4</b> Complete blueprints to guide the development of land use plans, based on what has been agreed upon in the land use planning meetings.</p>	<p>In Paraguay, a guide on “Municipal Delegation of Competencies” was developed (Annex P2.4). In Bolivia, a Diagnostic for Climate Change Program was completed for Ixiamas, and incorporated into the final Municipal Development Plan, while for Apolo an Integrated Territorial Development Plan was completed (Annex B2.1).</p>						
<p><b>Activity 2.5</b> Facilitate the process to sign a municipal diagnostic, annual plan or municipal by-law, in each of the 5 municipalities.</p>	<p>One draft by-law was elaborated for Puerto Casado about delegation of municipal competences and another on municipal waste treatment (Annex P2.7. and P2.8). Two by-laws were signed by the Municipality of Fuerte Olimpo, one to create the Environmental Unit (Annex P2.9) and one to create an environmental fee to sustain that Unit (Annex P2.10)</p> <p>Agreements with the Mother Earth Authority and with Association of Municipalities of Northern Tropical La Paz have been signed to channel national and departmental resources in support of sustainable land use and indigenous territorial management (Annex B2.5).</p>						
<p><b>Output 3.</b> Report on the impacts of sustainable ranching projects, evaluating and comparing biodiversity and poverty reduction impacts and value for money in two distinct contexts (Paraguay &amp; Bolivia).</p>	<table border="1"> <tr> <td data-bbox="477 951 958 1072"> <p><b>Indicator 3.1</b> Conservation and development impacts are rigorously analysed and compared at different ranching scales.</p> </td> <td data-bbox="969 951 2123 1072"> <p>Conservation and development impacts were assessed in two different scales of ranching practices and included in white papers and a paper submitted to a peer reviewed journal (See below).</p> </td> </tr> <tr> <td data-bbox="477 1075 958 1197"> <p><b>Indicator 3.2</b> Working paper outlining the effectiveness of sustainable ranching interventions is drafted by year 3.</p> </td> <td data-bbox="969 1075 2123 1197"> <p>A peer-reviewed scientific article on the conservation and development impacts of interventions at different ranching scales which was submitted for publication (Annex B3.3).</p> </td> </tr> <tr> <td data-bbox="477 1200 958 1396"> <p><b>Indicator 3.3</b> Project results are presented to all 5 participating municipalities during last two quarters of project.</p> </td> <td data-bbox="969 1200 2123 1396"> <p>The project results with large scale ranchers were presented during a trinational event where WCS participated along with all the mayors of municipalities of the Chaco region, including the three involved in this project (Annex P3.1). In Bolivia, the Manual on sustainable cattle ranching was published at the beginning of 2017, and was presented and distributed to both Ixiamas and Apolo municipalities and among strategic stakeholders and related institutions (Annex B4.1).</p> </td> </tr> </table>	<p><b>Indicator 3.1</b> Conservation and development impacts are rigorously analysed and compared at different ranching scales.</p>	<p>Conservation and development impacts were assessed in two different scales of ranching practices and included in white papers and a paper submitted to a peer reviewed journal (See below).</p>	<p><b>Indicator 3.2</b> Working paper outlining the effectiveness of sustainable ranching interventions is drafted by year 3.</p>	<p>A peer-reviewed scientific article on the conservation and development impacts of interventions at different ranching scales which was submitted for publication (Annex B3.3).</p>	<p><b>Indicator 3.3</b> Project results are presented to all 5 participating municipalities during last two quarters of project.</p>	<p>The project results with large scale ranchers were presented during a trinational event where WCS participated along with all the mayors of municipalities of the Chaco region, including the three involved in this project (Annex P3.1). In Bolivia, the Manual on sustainable cattle ranching was published at the beginning of 2017, and was presented and distributed to both Ixiamas and Apolo municipalities and among strategic stakeholders and related institutions (Annex B4.1).</p>
<p><b>Indicator 3.1</b> Conservation and development impacts are rigorously analysed and compared at different ranching scales.</p>	<p>Conservation and development impacts were assessed in two different scales of ranching practices and included in white papers and a paper submitted to a peer reviewed journal (See below).</p>						
<p><b>Indicator 3.2</b> Working paper outlining the effectiveness of sustainable ranching interventions is drafted by year 3.</p>	<p>A peer-reviewed scientific article on the conservation and development impacts of interventions at different ranching scales which was submitted for publication (Annex B3.3).</p>						
<p><b>Indicator 3.3</b> Project results are presented to all 5 participating municipalities during last two quarters of project.</p>	<p>The project results with large scale ranchers were presented during a trinational event where WCS participated along with all the mayors of municipalities of the Chaco region, including the three involved in this project (Annex P3.1). In Bolivia, the Manual on sustainable cattle ranching was published at the beginning of 2017, and was presented and distributed to both Ixiamas and Apolo municipalities and among strategic stakeholders and related institutions (Annex B4.1).</p>						

	<p><b>Indicator 3.4</b> Feedback from the municipalities is incorporated, and a technical white paper is completed by year 3.</p> <p><b>Indicator 3.5</b> White paper is tailored to a scientific audience and peer-reviewed scientific journal article on the conservation and development impacts of interventions at different ranching scales is submitted for publication by year 3.</p>	<p>Feedback from the local municipalities, private ranchers and indigenous territorial organizations was continuous.</p> <p>A white paper was produced for large private ranchers in Paraguay (Annex P3.2) and another to guide the implementation of the small-scale sustainable livestock projects in indigenous territories (Annex B3.2).</p>
<b>Activity 3.1</b> Conduct pre- and post- project surveys on livestock mortality, calving rate, off-take data, and income derived from livestock production.		Baseline and final surveys have been carried out in 8 private ranches in Paraguay (P1.2) and with 17 communities in Bolivia (Annex B1.1 and B1.2).
<b>Activity 3.2</b> Annually monitor land use change, deforestation, and densities of target wildlife species in project intervention areas.		Baseline deforestation and land use maps have been developed using GIS in both Paraguay and Bolivia. The deforestation analysis also includes references to regions with similar drivers of forest loss in order to properly assess the impact of the project (Annex P2.3; P1.3 and B1.3). Abundance of jaguars and their prey was monitored in Paraguay using camera traps and in Bolivia an analysis of wildlife occupancy was carried out (Annex P1.4, Annex B1.4).
<b>Activity 3.3</b> Conduct data analysis of the impacts of interventions on conservation and development.		Data analysis are presented in the technical white papers and the scientific article.
<b>Activity 3.4</b> Hold workshops with the participating municipalities, community groups, and indigenous organizations to discuss results and get feedback.		Coordination with the participating municipalities and their technical staff, as well as with the indigenous territorial organizations and individual private ranchers was continuous.
<b>Activity 3.5</b> Complete technical white paper.		A white paper was produced for large private ranchers in Paraguay (Annex P3.2) and another to guide the implementation of the small-scale sustainable livestock projects in indigenous territories (Annex B3.2).
<b>Activity 3.6</b> Write and submit peer-reviewed scientific article for publication.		A scientific article has been submitted to Agricultural Systems (Annex B.3).
<b>Output 4.</b> Outreach materials to disseminate lessons learned, each uniquely targeted toward a different audience	<b>Indicator 4.1</b> Manual on sustainable ranching is developed by year 3.	A manual was developed in Bolivia and a manual and brochure in Paraguay. (Annex P4.1 and P4.2)

<p>(community cattle managers, large cattle ranchers, local municipal governments, and national agencies in charge of agriculture, forests, and biodiversity conservation) and distributed according to audience (print vs. web-based).</p>	<p><b>Indicator 4.2</b> Manual on sustainable ranching is uniquely tailored for different audiences (e.g. agriculture government authorities, NGOs) and different mediums of distribution (e.g. social networks, websites, print) by year 3.</p>	<p>The Paraguay manual is tailored to large scale ranchers and municipal technical staff (Annex P4.1). A brochure was developed for decision makers (Annex P4.2.). In Bolivia, the manual of sustainable ranching has been designed as an illustrated manual to target small scale indigenous ranchers, as well as veterinarians and agronomists working with them (Annex B4.2).</p>
<p><b>Activity 4.1</b> Develop a manual on sustainable ranching.</p>	<p>In Paraguay, the "Manual of Best Farming practices" was developed, printed in 500 copies and also made available digitally.</p> <p>In Bolivia, the "Manual on sustainable cattle ranching management" was printed in 300 copies and is also available digitally.</p>	
<p><b>Activity 4.2</b> Tailor the manual to different audiences.</p>	<p>A brochure was developed for decision makers to accompany the manual of best farming practices in Paraguay. The manual in Bolivia was developed in a didactic manner.</p>	
<p><b>Activity 4.3</b> Present manual to local authorities, NGOs, and biodiversity and agriculture national government institutions.</p>	<p>Both manuals were widely distributed in Bolivia and Paraguay, both in printed form and digitally to local authorities, NGOs, biodiversity and agricultural government institutions (Annex P4.3, Annex B4.1 and B4.2).</p>	
<p><b>Activity 4.4</b> Share manual in electronic form on social networks, websites and partner institution networks.</p>	<p>The manual is available at <a href="#">WCS Paraguay</a> and <a href="#">WCS Bolivia</a> websites.</p>	
<p><b>Output 5.</b> Policy recommendations, developed jointly with local municipalities to facilitate replication of improved livestock management techniques and participatory land use management processes at the national level.</p>	<p><b>Indicator 5.1</b> Policy recommendations for scaling up sustainable ranching interventions are developed.</p> <p><b>Indicator 5.2</b> Policy recommendations are shared directly with municipalities and national government entities in Bolivia and Paraguay.</p> <p><b>Indicator 5.3</b> Policy guidelines for integrating sustainable ranching techniques and land-use planning processes into national and regional biodiversity and poverty alleviation strategies are developed and distributed.</p>	<p>Policy recommendations were developed in both Bolivia and Paraguay (Annex P5.1; B5.1).</p> <p>Policy recommendations on sustainable ranching have been shared with the two municipal authorities in Bolivia (Ixiamas and Apolo) and incorporated into their new municipal development plans (B.2.1). In Paraguay, the resulting policy recommendations made by a former Ministry of Environment have been widely shared with municipalities at the local and tri-national level as shown in (Annex P3.1 and Annex P5.2). In addition, the methodological guide to improve municipal management through the "Delegation of Competencies" has been developed and applied in the project intervention area (Annex P2.4)</p> <p>Policy guidelines for integrating sustainable ranching techniques and land-use planning processes into national and regional biodiversity and poverty alleviation strategies were developed in both Paraguay and Bolivia. (Annex P5.1) and also (Annex B.5.1)</p>

<p><b>Activity 5.1</b> Conduct a thorough review of the national development plans, agriculture sector plans, national biodiversity strategies, and poverty alleviation strategies of Bolivia and Paraguay.</p>	<p>A detailed compilation of development plans, agricultural sector plans, wildlife national strategies, and poverty relief strategies in Paraguay was performed as a tool to improve interventions in the country (Annex P5.1). In Bolivia, we worked with the Association of Municipalities of Northern Tropical La Paz (MMNPT) to carry out a thorough review of rural development policies and supported the establishment of a technical platform to support sustainable ranching in 8 Municipalities including Apolo and Ixiamas (Annex B5.1).</p>
<p><b>Activity 5.2</b> Draft policy recommendations for implementation of sustainable ranching practices and participatory land use processes at the national level, for both Bolivia and Paraguay.</p>	<p>In Bolivia, the MMNPT held two workshops to share successful experiences and lessons learned with local stakeholders, municipal and national representatives. Additionally, the MMNPT developed a series of policy guidance for priority productive chains, including sustainable ranching with inputs from these workshops and the development plan review. These policy recommendations were shared with 8 local municipalities. Additionally, the policy guidelines were also presented, through the municipal authorities and producer organizations of Apolo and Ixiamas, to the Rural Development Ministry and the Mother Earth National Authority (Annex B5.1 and B5.2).</p> <p>In Paraguay, on the basis of the compilation mentioned in 5.1., a document was developed with the policy guidelines for integrating sustainable farming techniques and planning land use in national and regional biodiversity strategies (Annex P5.1).</p>
<p><b>Activity 5.3</b> Finalize policy recommendations, in consultation with the 5 participating municipal governments and national biodiversity and agricultural sector government authorities.</p>	<p>Policy recommendations were finalized with the participating municipal authorities and engaging with national authorities in Paraguay and Bolivia (Annex P5.2, B.5.1)</p>
<p><b>Activity 5.4</b> Submit policy recommendations to national government entities in Bolivia and Paraguay.</p>	<p>In Paraguay policy recommendations were submitted to local municipal governments, national authorities and at tri national regional coordination platforms (Annexes P3.1 and P5.2).</p> <p>In Bolivia, policy recommendations have been presented as funding proposals to the Indigenous Fund of the Ministry of Rural Development and Land through the Lecos and T´simane indigenous organizations, and to the Ministry of Planning through the municipal development plans of Apolo and Ixiamas (Annex B 5.3).</p>
<p><b>Activity 5.5</b> Share general, widely applicable policy recommendations through social networks, websites and partner institution networks, with the goal of reaching similar contexts in Latin America and beyond.</p>	<p>WCS is part of the driving committee for a tri national biosphere reserve in the Chaco and policy recommendations are being shared in this platform (Annex P5.3.).</p> <p>General, widely applicable policy recommendations have been shared through social networks, websites and partner institution networks. See <a href="#">WCS Paraguay</a> and <a href="#">WCS Bolivia</a> sites. (Annex B5.4)</p>

### Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
<b>Training Measures</b>							
1a	Number of people to submit PhD thesis						
1b	Number of PhD qualifications obtained						
2	Number of Masters qualifications obtained						
3	Number of other qualifications obtained	1	Bolivian	Female	Bachelor degree	Spanish	Bachelor Thesis Lizet Tinta
4a	Number of undergraduate students receiving training	8	Bolivian	5 female 3 male	Final year Internship required to obtain degree as Veterinarians	Spanish	5 months of training
4b	Number of training weeks provided to undergraduate students						120 weeks of training since June 2014 to June 2015
4c	Number of postgraduate students receiving training (not 1-3 above)						
4d	Number of training weeks for postgraduate students						
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification (e.g., not categories 1-4 above)						
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above) <b>(A)</b>	39 representatives from Municipalities of Puerto Casado, Carmelo Peralta, and Fuerte Olimpo	Paraguayan	6 women 33 men	Tools provided in the municipal organic law for environmental management in municipalities	Spanish	All of them were local municipal authorities
	<b>(B)</b>	3 municipal staff from Puerto Casado municipality	Paraguayan	3 men	How to apply IT monitoring tools to natural	Spanish	

					resources in their territory		
6b	Number of training weeks not leading to formal qualification <b>(A)</b>	1 week in total (during two years)					
	<b>(B)</b>	2 weeks					
7	Number of types of training materials produced for use by host country(s) (describe training materials)	10					1) Tutorials and procedures for GIS and GPS training in municipalities (3 different volumes).Annex P2-11 2) Manual of Best Farming Practices 3) Policy guidelines for effective integration of sustainable farming techniques into public policies 4) Guide for municipalities on delegation of competences 5) Manual of sustainable ranching 6) Training Module 1: The 4 pillars of cattle production 7) Training Module 2: Livestock husbandry infrastructure 8) Training Module 3: Animal health 8.1) Vademecum handbook of medicines and treatments for livestock in Apolo. 9) Training Module 4. Pasture and cattle management 10) Training Module 5. Feeding our animals All included in Annex B.1.2 Annex Training Units

Research Measures		Total	Nationality	Gender	Title	Language	Comments/Weblink if available
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (ies)						
10	Number of formal documents produced to assist work related to species identification, classification and recording.						
11a	Number of papers published or accepted for publication in peer reviewed journals						1 paper presented for publication-not yet accepted
11b	Number of papers published or accepted for publication elsewhere						
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country						
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country						
13a	Number of species reference collections established and handed over to host country(s)						
13b	Number of species reference collections enhanced and handed over to host country(s)						

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	5	Paraguayan	105 women (48%) 113 men (52%)	Participation in territorial planning	Spanish	
		5	Paraguayan	135 women (66%) 69 men (34%)	Participation in territorial planning and potential actions lines for improved land use	Spanish	
		5	Bolivian	Women: 472 (43.4%) Men: 615 (56.6%)	Sustainable Ranching Management	Spanish	



Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
		1	Bolivian	Women: 21 (19,1%) Men: 89 (80,9%)	Assessment of cattle production in the Municipality of Ixiamas (GAMIX)	Spanish	
14b	Number of conferences/seminars/workshops attended at which findings from Darwin project work will be presented/disseminated.	2	Tri-national (Paraguay, Bolivia and Argentina)  XXI Congress of ABOPA (Bolivian Association of Animal Production)	15 women (32%) 32 men (68%)  +-20 women (33%) +-40 men (67%)	Strengthening of local governments.  Sustainable ranching in indigenous land.	Spanish  Spanish	

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)		Office furniture; GIS software and field equipment for the Environmental Unit at Puerto Casado Municipality (Paraguay).

Financial Measures		Total	Nationality	Gender	Theme	Language	Comments
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work						

## Annex 4 Aichi Targets

	Aichi Target	Tick if applicable to your project
1	People are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	✓
2	Biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	
3	Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	
4	Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	✓
5	The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	✓
6	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	
7	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	✓
8	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	
9	Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	
10	The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	
11	At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	
12	The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	✓
13	The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	

14	Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	
15	Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	
16	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	
17	Each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	
18	The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	
19	Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	✓
20	The mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	

## Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. web link, contact address etc)
Manual*	Manual of Good Farming Practices, WCS Paraguay, 2016.	Paraguayan	Paraguayan	Not applicable (institutional publication)	WCS Paraguay, Asunción	Digital version available in Annex 19 and at: <a href="https://paraguay.wcs.org/en-us/About-Us/Publications.aspx">https://paraguay.wcs.org/en-us/About-Us/Publications.aspx</a>
Manual*	Public Policy Guidelines for sustainable livestock management, WCS Paraguay, 2016.	Paraguayan	Paraguayan	Not applicable (institutional publication)	WCS Paraguay, Asunción	Digital version available in Annex 21 and at: <a href="https://paraguay.wcs.org/en-us/About-Us/Publications.aspx">https://paraguay.wcs.org/en-us/About-Us/Publications.aspx</a>
Manual*	Delegation of Competences in the Municipalities	Paraguayan	Paraguayan	Not applicable (institutional publication)	WCS Paraguay, Asunción	Digital version available in Annex11 and at: <a href="https://paraguay.wcs.org/en-us/About-Us/Publications.aspx">https://paraguay.wcs.org/en-us/About-Us/Publications.aspx</a>
Manual*	Manual of sustainable ranching, WCS Bolivia, 2017	Bolivian	Bolivian	Male	WCS Bolivia, La Paz	Digital version available in Annex XX and at: <a href="https://bolivia.wcs.org/es-es/Recursos-Informativos/Biblioteca/Publicaciones.aspx">https://bolivia.wcs.org/es-es/Recursos-Informativos/Biblioteca/Publicaciones.aspx</a>

## Annex 6 Darwin Contacts

<b>Ref No</b>	21-004
<b>Project Title</b>	Sustainable Ranching and Participatory Land Use Planning in Bolivia and Paraguay
<b>Project Leader Details</b>	
Name	Lilian Painter, PhD.
Role within Darwin Project	Project leader
Address	Calle Gabino Villanueva No. 340
Phone	
Fax/Skype	
Email	
<b>Project Co-Leader Details</b>	
Name	Maria del Carmen Fleytas
Organisation	WCS Paraguay
Role within Darwin Project	Project Coordinator in Paraguay
Address	Pitiantuta 664 casi Siria, Asuncion, Paraguay
Fax/Skype	
Email	
<b>Partner 1</b>	
Name	Angel Durán
Organisation	Central Indígena del Pueblo Leco de Apolo (CIPLA)
Role within Darwin Project	Coordinador técnico CIPLA
Address	Apolo, Provincia Franz Tamayo, La Paz - Bolivia
Fax/Skype	
Email	
<b>Partner 2</b>	
Name	Germán Nate
Organisation	Consejo Regional T´simane Mosekene (CRTM)
Role within Darwin Project	President of CRTM
Address	Calle Busch esquina Campero S/N
Fax/Skype	
Email	
<b>Partner 3</b>	
Name	Robert Cartagena
Organisation	Consejo Indígena del Pueblo Tacana (CIPTA)
Role within Darwin Project	Natural Resources Secretary
Address	Localidad de Tumupasa, La Paz, Bolivia
Fax/Skype	
Email	